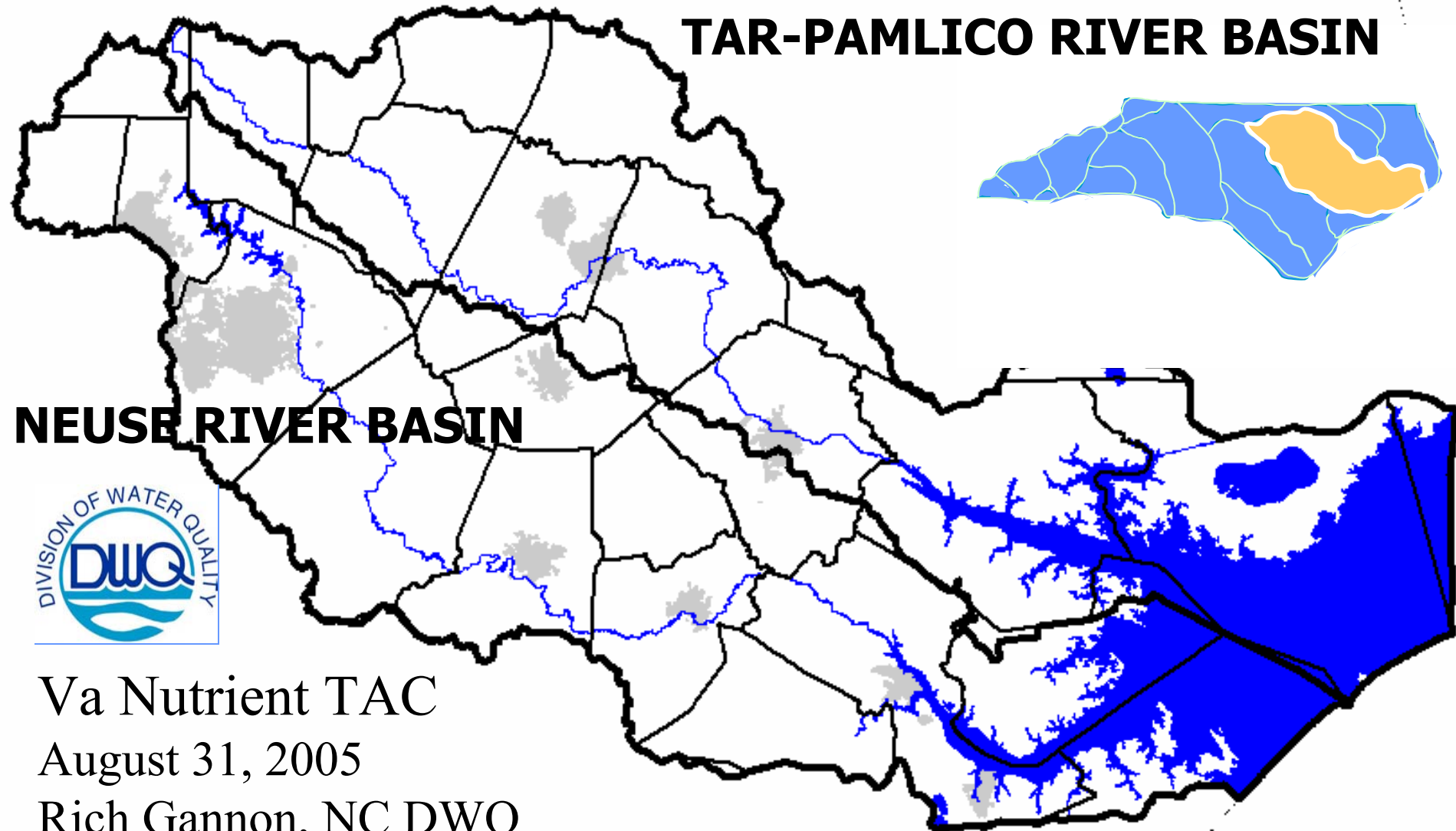
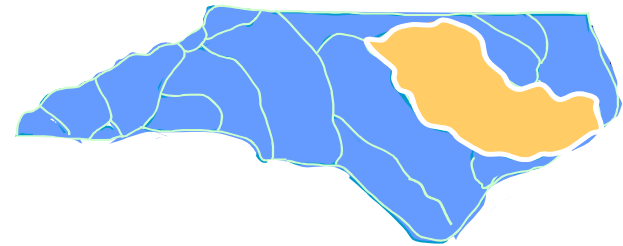


Pollutant Trading in North Carolina's River Basins

TAR-PAMLICO RIVER BASIN



Va Nutrient TAC

August 31, 2005

Rich Gannon, NC DWQ

North Carolina's River Basins



★ Trading in place

★ Scheduled or draft nutrient strategy

Trading or 'Trading'?

Trading Proper

- Most cost-effective means to goal
- Overall mass reduction goal/cap, individual allocations
- Market-driven exchange of credit to meet allocations
- Individual-to-individual, under same regulation

In-Lieu Fees in NC Nutrient Strategies

- More cost-effective means to goal
- Sources have allocations, achieve partial reduction
- Pay preset \$/lb remaining
- \$ to more cost-effective source controls
- Other source may not be under same/any regulation

Where is there Trading in NC?

Point Source Effluent Trading

- Neuse Compliance Association

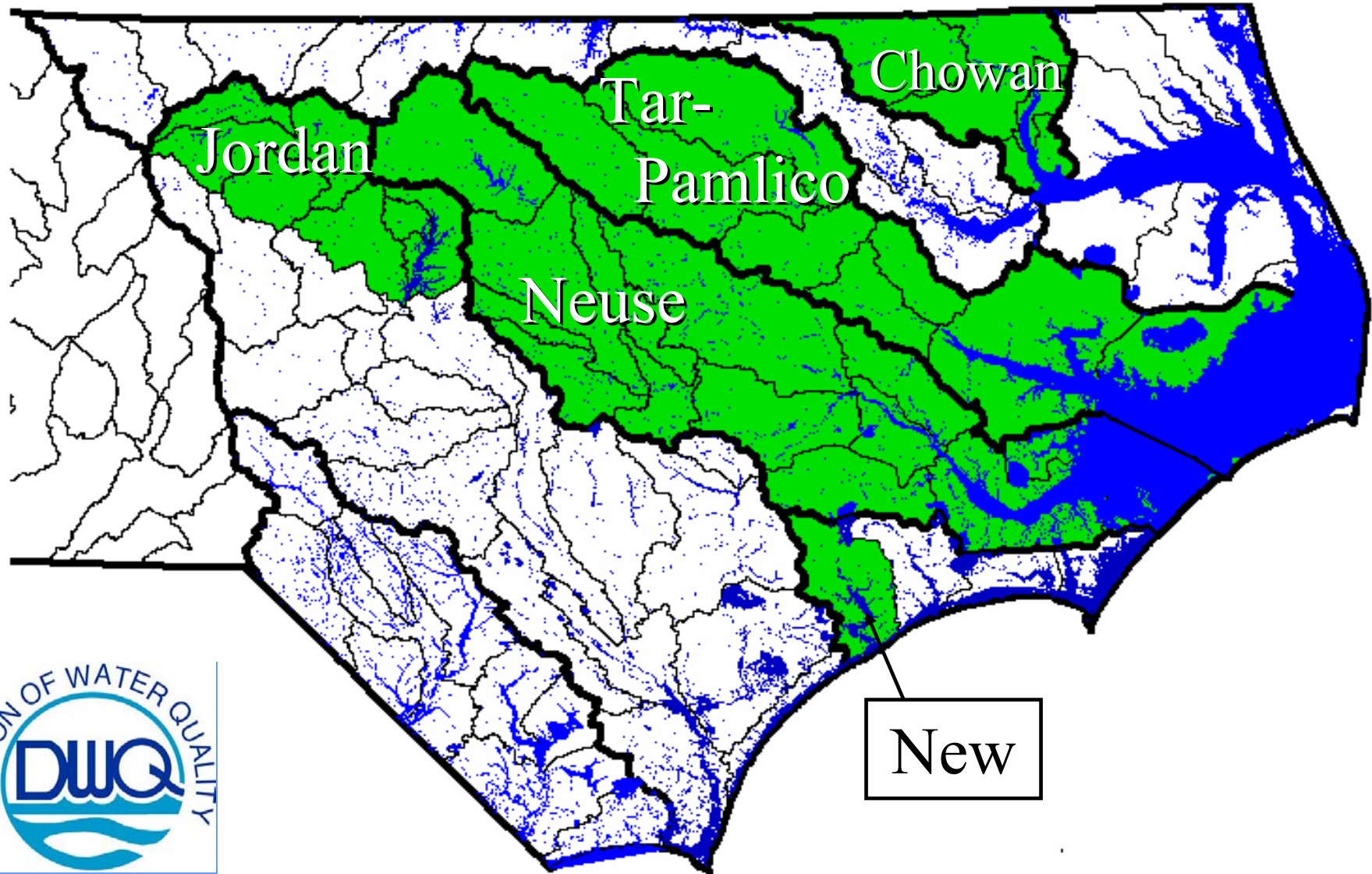
Point-Nonpoint In-Lieu Fees

- Tar-Pamlico Basin Assoc. \Rightarrow NC Ag Cost Share Program
- Neuse Compliance Assoc. \Rightarrow NC EEP WRF

Nonpoint-Nonpoint In-Lieu Fees

- Neuse new development \Rightarrow NC EEP WRF
- Tar/Neuse/Catawba buffer impacts \Rightarrow NC EEP RBRF
- Tar, Jordan new development \Rightarrow NC EEP WRF (draft)
- Jordan existing development \Rightarrow NC EEP WRF (draft)
- Jordan new, existing development \Rightarrow ? (draft)

‘Nutrient Sensitive Waters’ in North Carolina



Tar-Pamlico Nutrient Strategy

1989 “Nutrient Sensitive Waters”

1990 Point source cap, trading plan

1995 Phase II:

- Estuary goals: 30% N ↓, no P ↑
- Refined point source caps, trading
- Voluntary nonpoint source plan

2000 Nonpoint source rules:

- *Riparian Buffer Protection*
- *Urban Stormwater*
- *Fertilizer Management*
- *Agriculture*

2005 Phase III: Estuary clean-up
by 2013

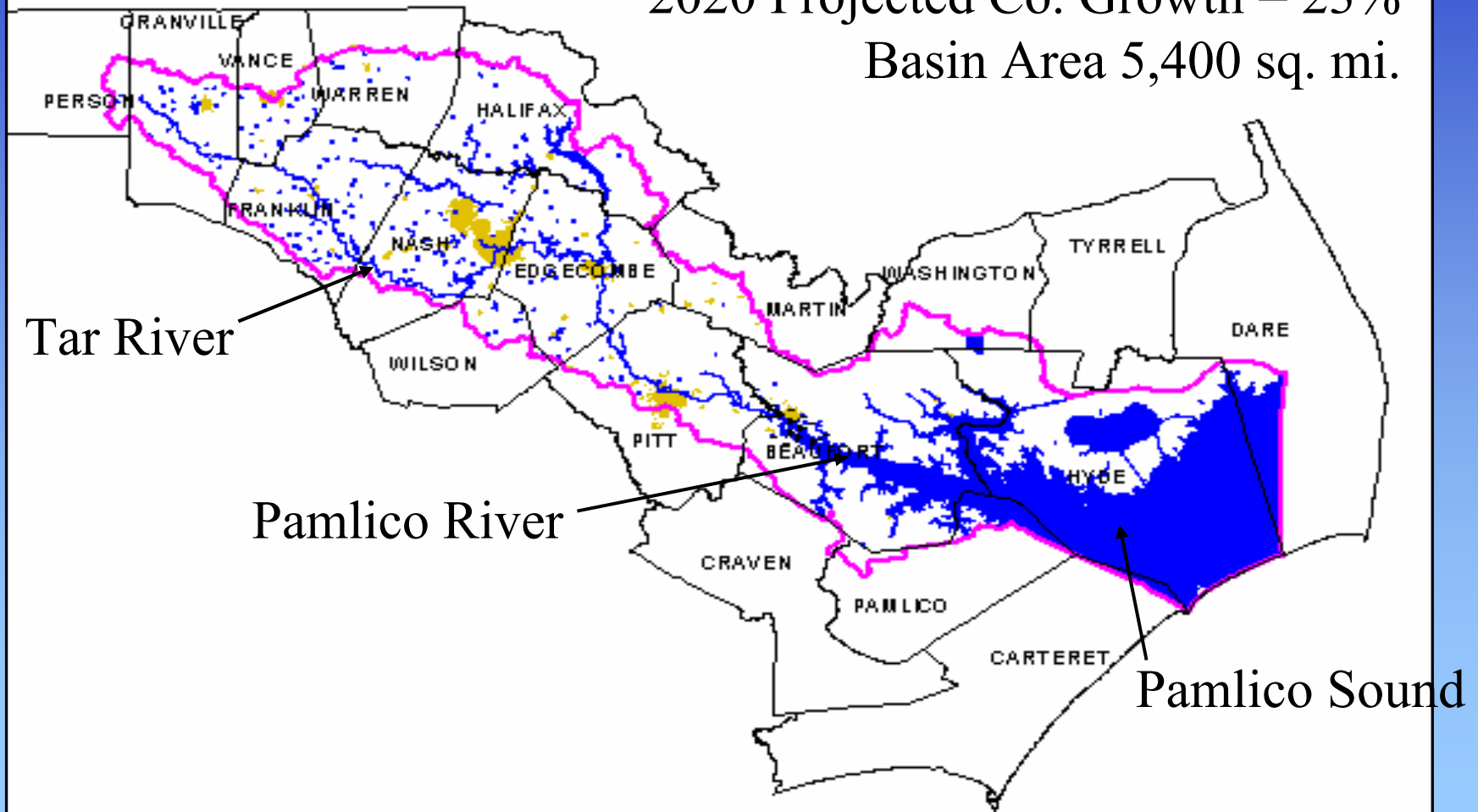


Tar-Pamlico River Basin Overview

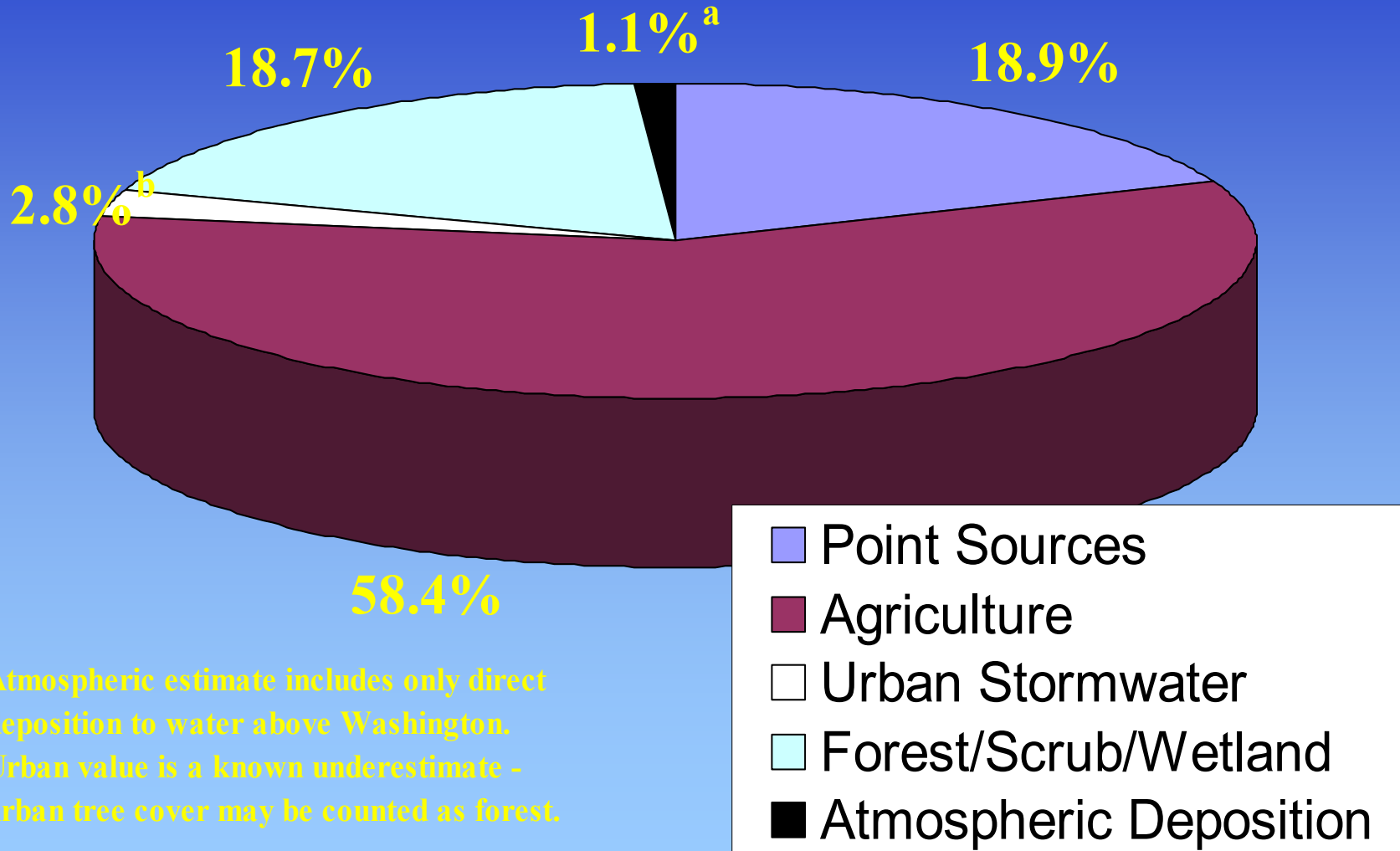
2000 Basin Population = 415,000

2020 Projected Co. Growth = 23%

Basin Area 5,400 sq. mi.



Sources of Nitrogen to Pamlico River (% of N Load at Washington)



Trial and Error - Early Proposals

- Ø Technology limits N and P
- Ø Technology limits or offset w/ \$11 m over 5 yrs.
for equivalent ag BMPs

Final Phase I Agreement ('90-'94)

Association of dischargers (14)

- Annual step-down cap 525,000 \Rightarrow 425,000 kg N+P
- Exceed cap? Ag BMPs at \$56/kg
- Fund estuary model
- Earnest money trial of offset system
- Optimize facilities for nutrients
- Signatories included environmental groups

Phase II 1995 - 2004

- Performance goals per estuary model:
30% N ↓ from 1991, hold P at 1991
- Association (16) steady annual N, P caps
- No individual limits
- Exceed cap? Ag BMPs at \$29/kg N
- Caveat for local water quality impacts
- Non-Association dischargers - separate rule:
technology limits + offset any new loading
- Enviro's did not sign

Agriculture BMP N Offset Rate

$$2(\$13/\text{kg N}) + 0.1[2(\$13)] = \$29/\text{kg N}$$

Uncertainty

Administration

Cost-
effectiveness
high end

Draft Revision to EEP Offset Rate

to provide for stormwater BMP retrofits

Stormwater BMP
Cost-Effectiveness

Reduction
Needed

BMP
Lifespan

$$N \text{ Fee} = [\$57/\text{lb} (\# \text{lb}/\text{yr})(30 \text{ yrs}) + \\ \$/\text{ac}(1/35)(\text{Ac Developed})] \times 1.1$$

Cost of
Developed Land

BMP/Drainage
Area Ratio

Admin Cost Factor

$$P \text{ Fee} = \$45/0.1 \text{ lb} \times (\text{same as above})$$

For wastewater load offsets, land cost factor = 0

Tar-Pamlico Nutrient Strategy

Where do Point Source Offset Payments Go?

- NC “Agriculture Cost Share Program for Nonpoint Source Pollution Control”
- Voluntary, 75% state / 25% producer
- Offset transparent to producer
- DSWC Basin Coordinator tracks, targets contracts
- Compliance monitoring:
 - SWCDs inspect min 5% contracts/yr
 - All animal waste systems inspected twice/yr
 - DSWC reviews local programs @ 5 yrs
- Compliance or pay back or Attorney General

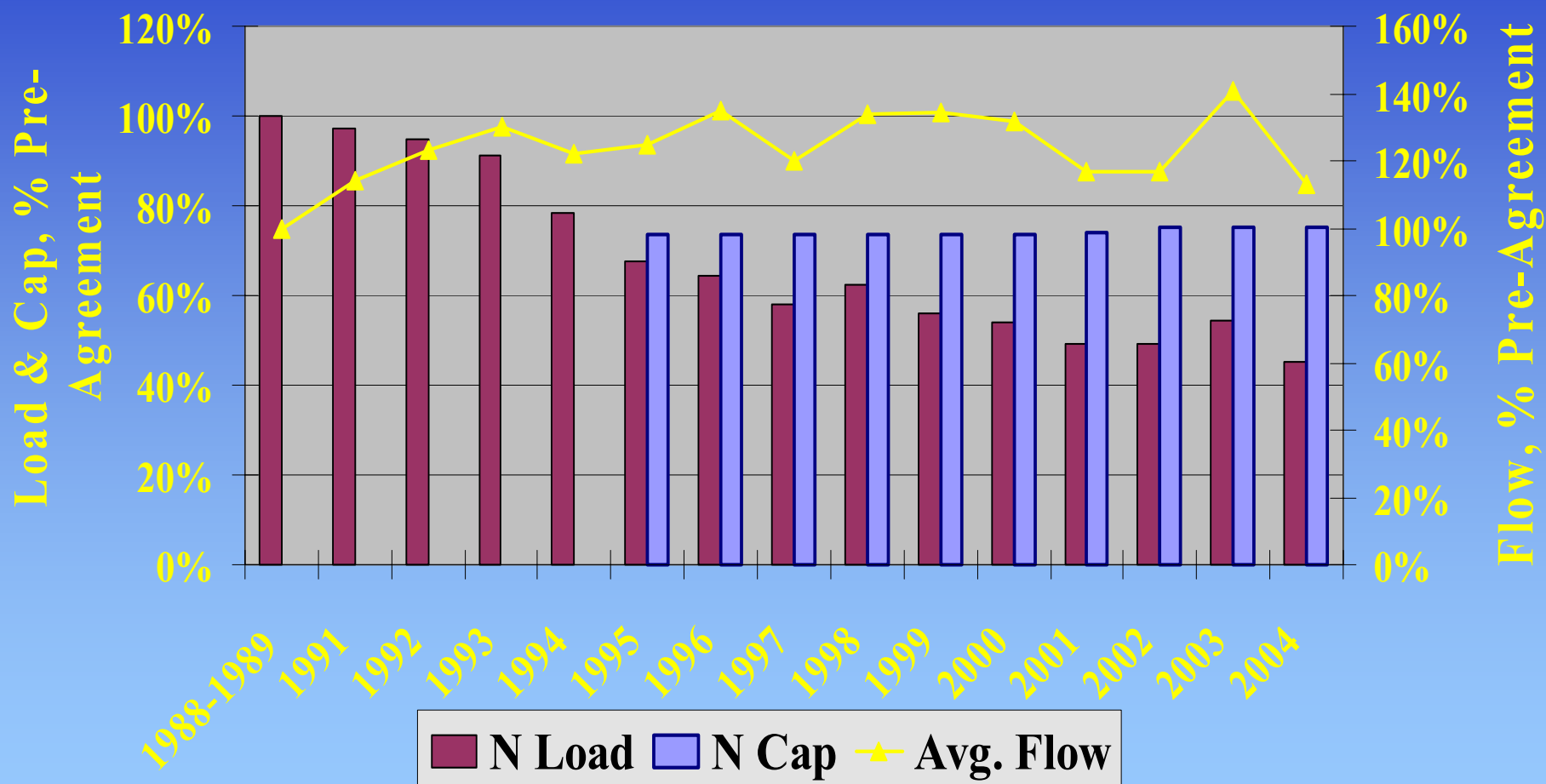
NC Ecosystem Enhancement Program Offset Payment Administration

- In-Lieu Fee Coordinator tracks offset \$ sources geographically
- NCSU and local governments i.d. potential projects
- Offset BMP located no further from estuary than load being offset – committee selects
- Projects given to on-call EEP contractor pool
- Contractor responsible for design, construction, & 1 yr performance monitoring
- 30-yr O&M – gov't entity: local, community college, etc.
- To date, ~\$5 million offset fees, all Neuse stormwater
- Numerous projects in design, most constructed wetlands, none in ground

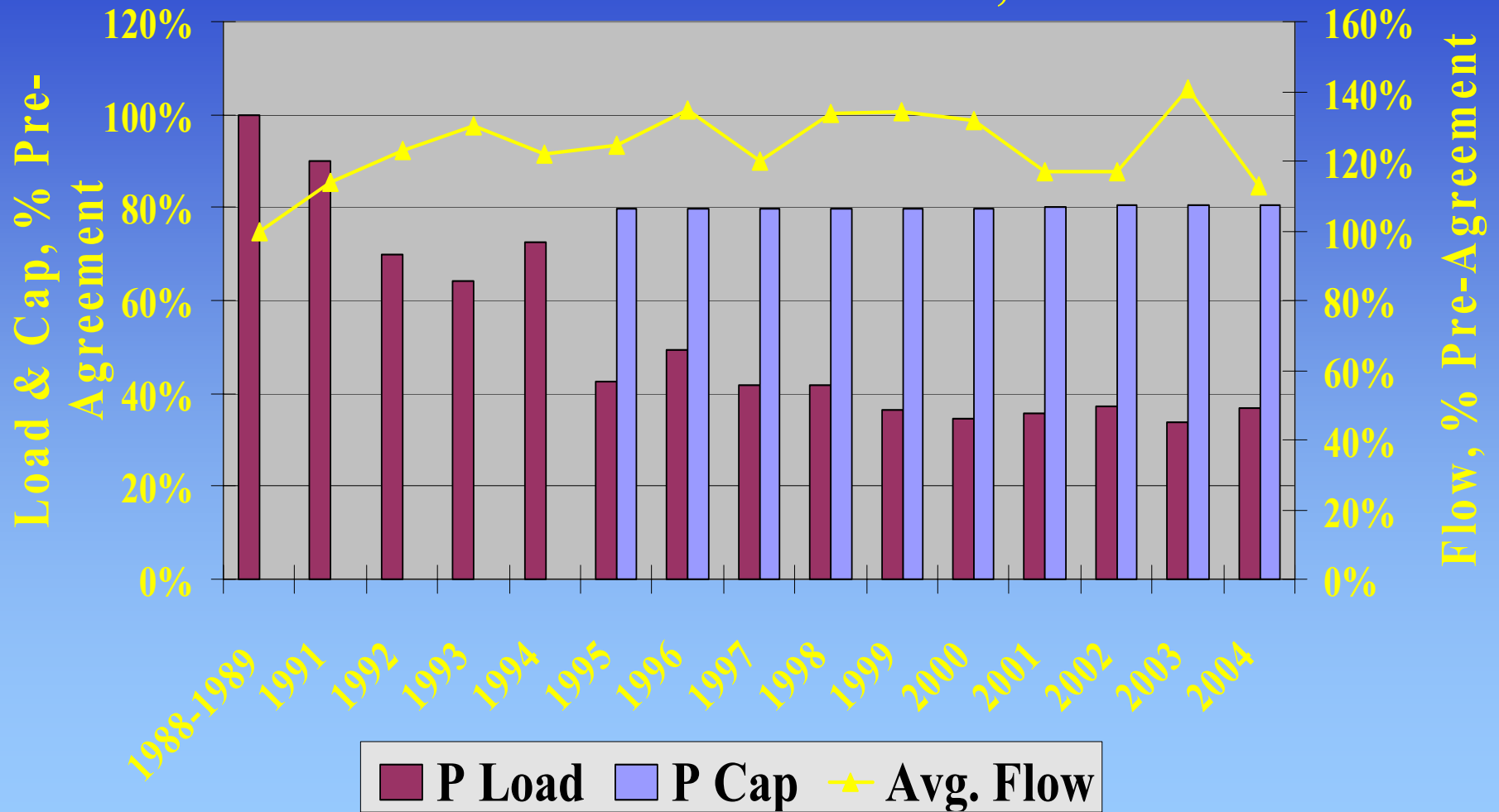
N Cost-Effectiveness Comparison

Practice	\$/lb Reduced (30-Yr. Life Equiv.)
Agriculture	
• Water Control Structure	\$1.20
• Nutrient Management	\$7 - \$9
• Vegetated Filter Strip	\$7 - \$8
• Conservation Tillage	\$20 - \$80
Stormwater Wet Det. / Bioret.	\$57 - \$86
Riparian Wetland Restoration	\$11 - \$20

Point Source Association Nitrogen Loads, Tar-Pamlico River Basin, NC



Point Source Association Phosphorus Loads, Tar-Pamlico River Basin, NC



How Were Reductions Achieved?

Optimized existing operations for N, P removal

Two major facilities implemented nutrient removal

Together put Assoc. below caps, gave time for others to install nutrient removal very cost-effectively as otherwise expanding, renovating, etc.

Nutrient Removal Installed by Association Members

• 1985, 1995	Greenville	9.8 MGD
• 1992	Rocky Mount	13.2
• 1992	Washington	1.8
• 1994	Louisburg	0.8
• 1997	Enfield	0.6
• 2000	Robersonville	1.4
• 2001	Belhaven	<u>0.4</u>
		28.0

(Full Association = 34.1 MGD)

How Cost-Effective Were Reductions?

No good numbers, but to meet Phase I caps:

- Initial optimization: \$50,000 study
- Nutrient removal installed at Greenville, Rocky Mt. \$?
- (Estuary model \$300,000)

Vs.:

- Uniform technology limits estimate \$50-\$100 m

Or:

- Ag BMPs estimate \$11.8 million

Nonpoint Source Rules

Tar-Pamlico Nutrient Strategy

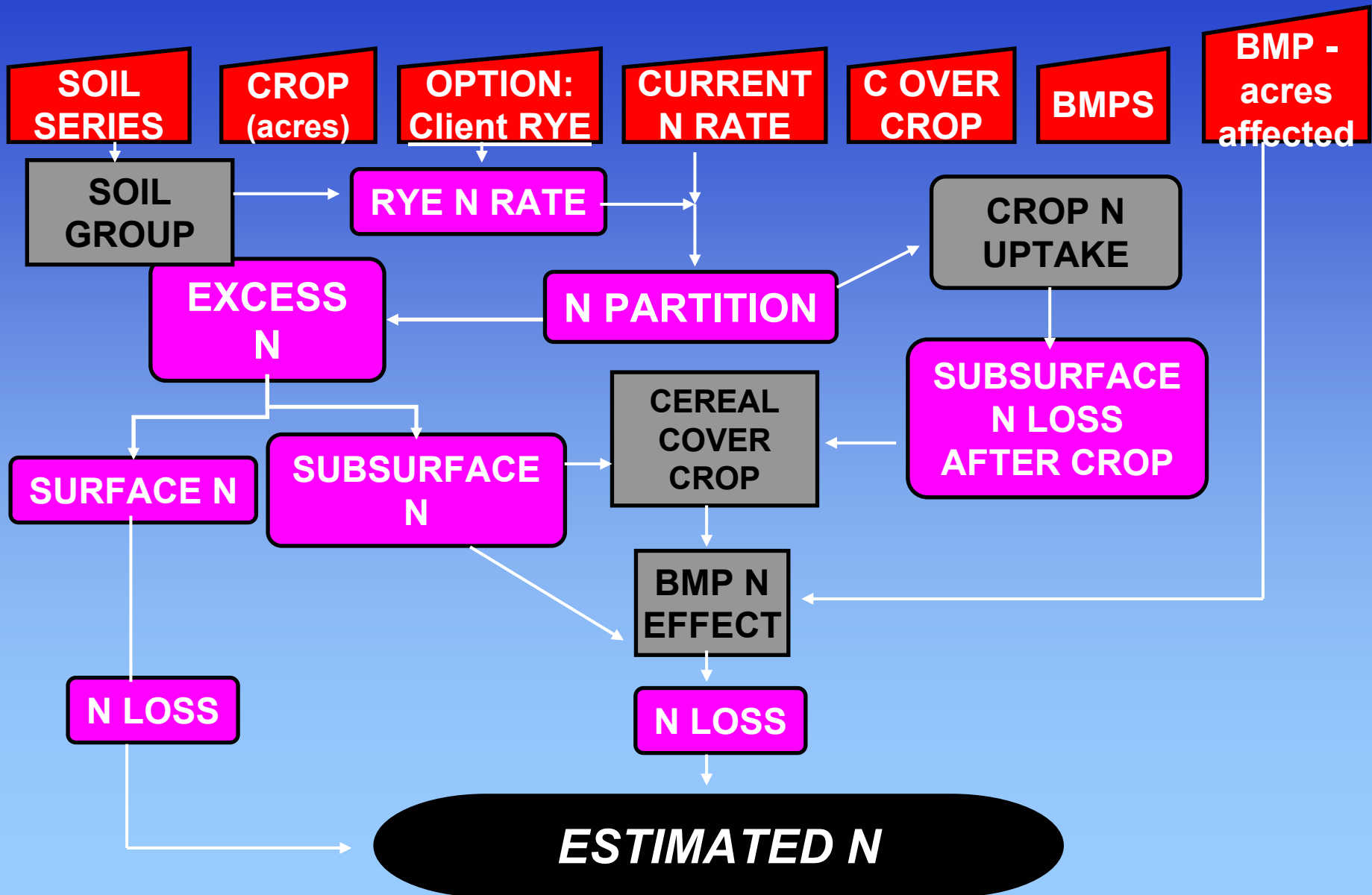
① Agriculture

- Counties - 30% ↓ N loss by April 2006
- No ↑ P
- Local & basin committees, annual reports

② Fertilizer Management

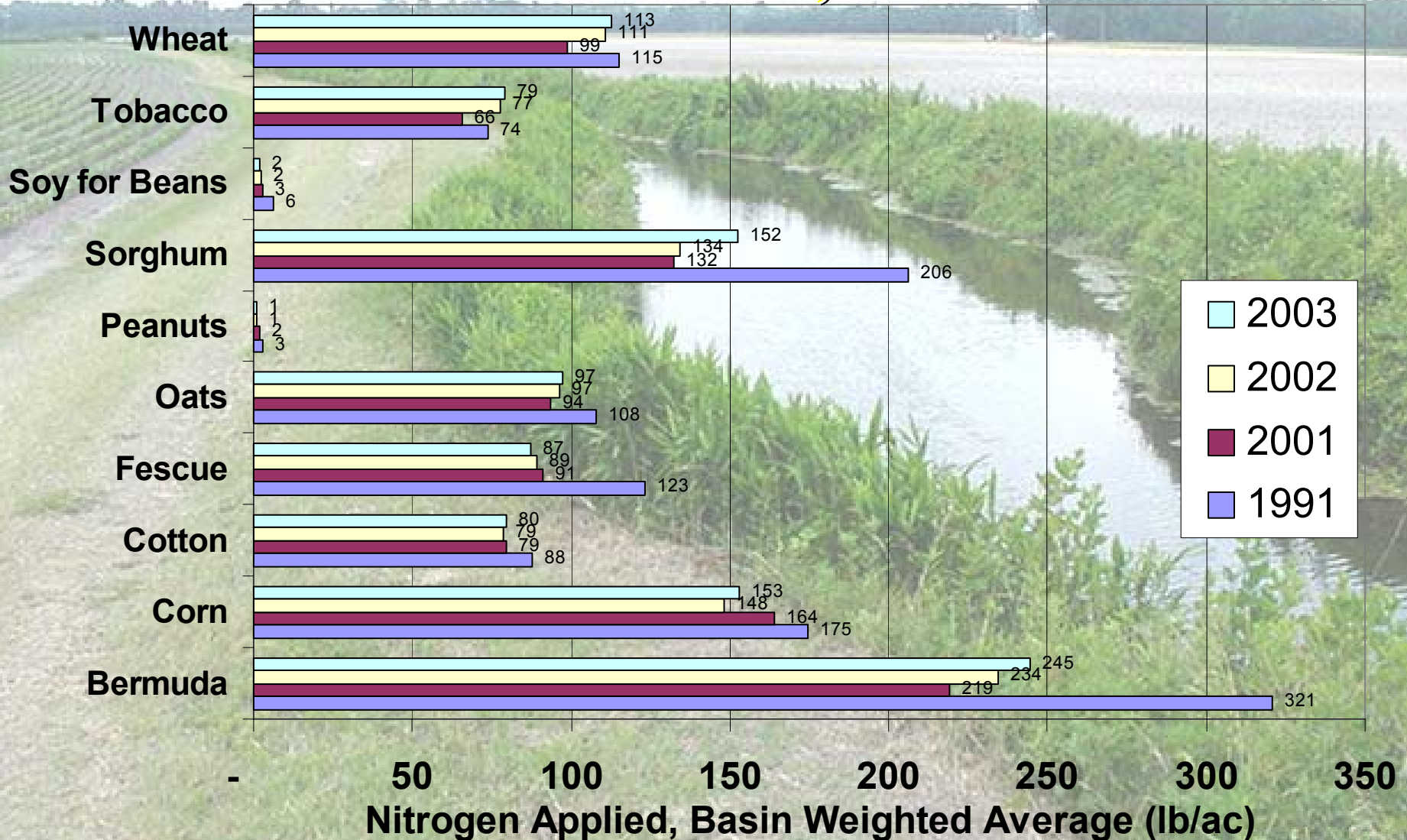
- Applicators - training or plans by April 2006
- Homeowners - DWQ education program

Agricultural Nitrogen Loss Accounting Tool



45% Reduction in Agricultural N Loss

Tar-Pamlico Basin, 1992-2003



Nonpoint Source Rules

Tar-Pamlico Nutrient Strategy

③ Riparian Buffer Protection

- Protects 50-foot vegetated buffers existing 1/00
- Existing uses in buffer continue
- Change of use must establish buffer
- To curb load increases



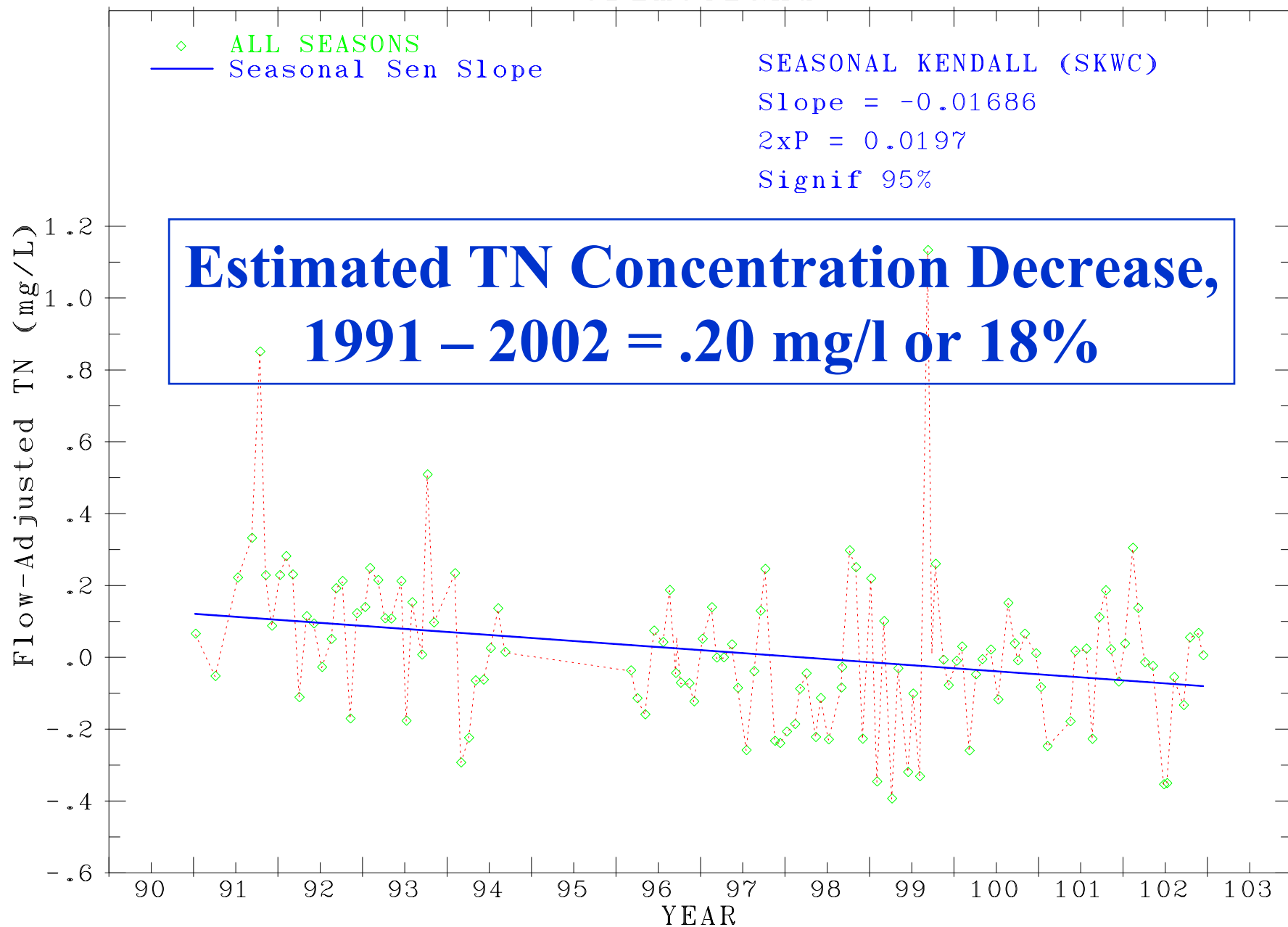
④ Urban Stormwater

11 local governments carry out

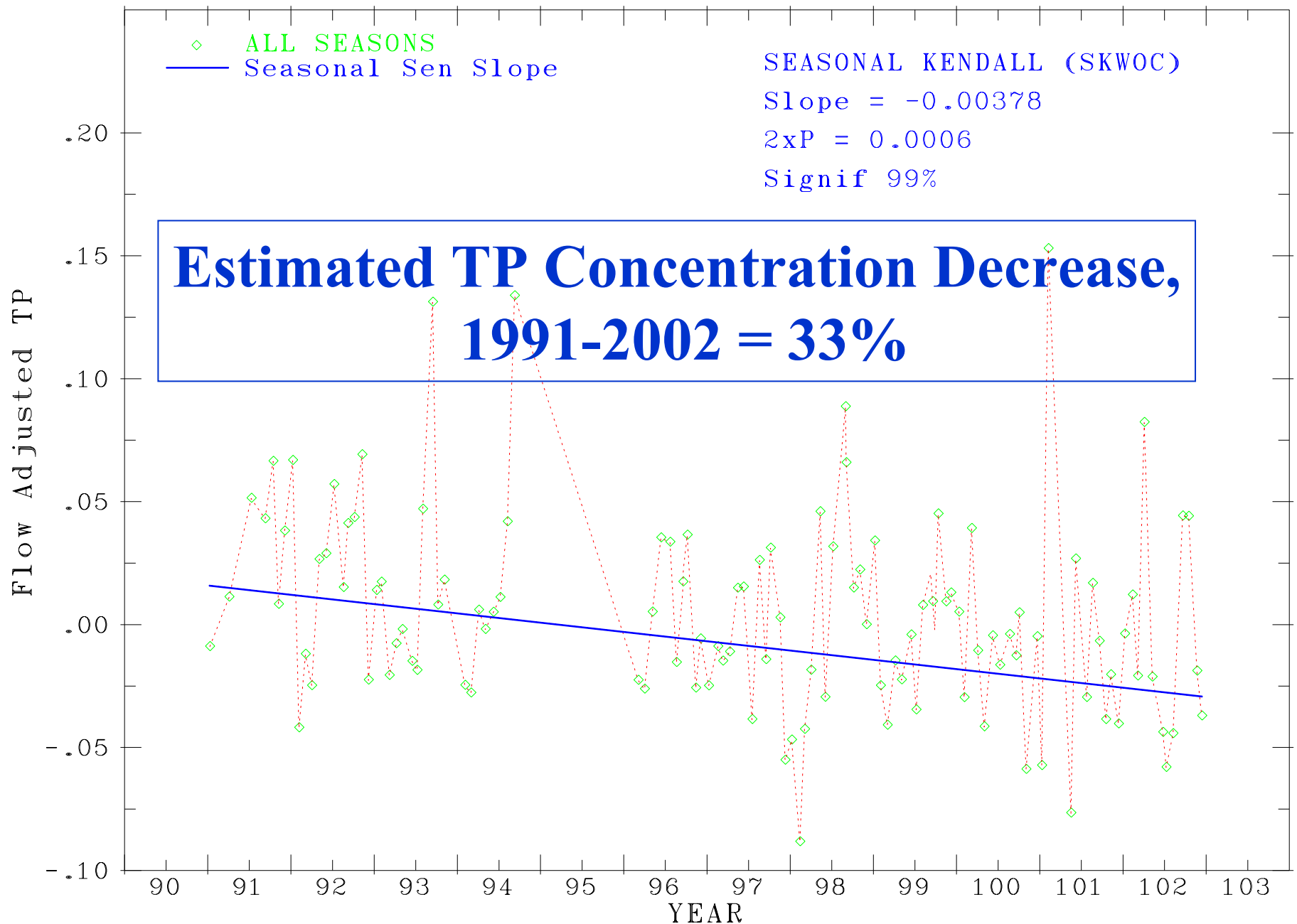
- New development permitting
- Illicit discharge detection & removal
- Education programs & seek retrofits

Catchment 1:			Stormwater Export Calculation				
Total acreage of catchment 1 =		ac					
First BMP's TN removal rate =		%		First BMP's TP removal rate =		%	
Second BMP's TN removal rate =		%		Second BMP's TP removal rate =		%	
Third BMP's TN removal rate =		%		Third BMP's TP removal rate =		%	
TOTAL TN REMOVAL RATE =	0	%		TOTAL TP REMOVAL RATE =	0	%	
(1) Type of Land Cover	(2) Catchment Acreage	(3) S.M. Formula (0.46 + 8.3I)	(4) Average EMC of TN (mg/L)	(5) Column (2) * (3) * (4)	(6) Average EMC of TP (mg/L)	(7) Column (2) * (3) * (6)	
Transportation impervious			2.60		0.19		
Roof impervious			1.95		0.11		
Managed pervious			1.42		0.28		
Wooded pervious			0.94		0.14		
Area taken up by BMP			1.95		0.11		
Fraction Impervious (I) =			Pre-BMP TN Load (lb/yr) =		Pre-BMP TP Load (lb/yr) =		
Total Area of Development =			Pre-BMP TN Export (lb/ac/yr) =		Pre-BMP TP Export (lb/ac/yr) =		
			Post-BMP TN Load (lb/yr) =		Post-BMP TP Load (lb/yr) =		
			Post-BMP TN Export (lb/ac/yr) =		Post-BMP TP Export (lb/ac/yr) =		

Grimesland

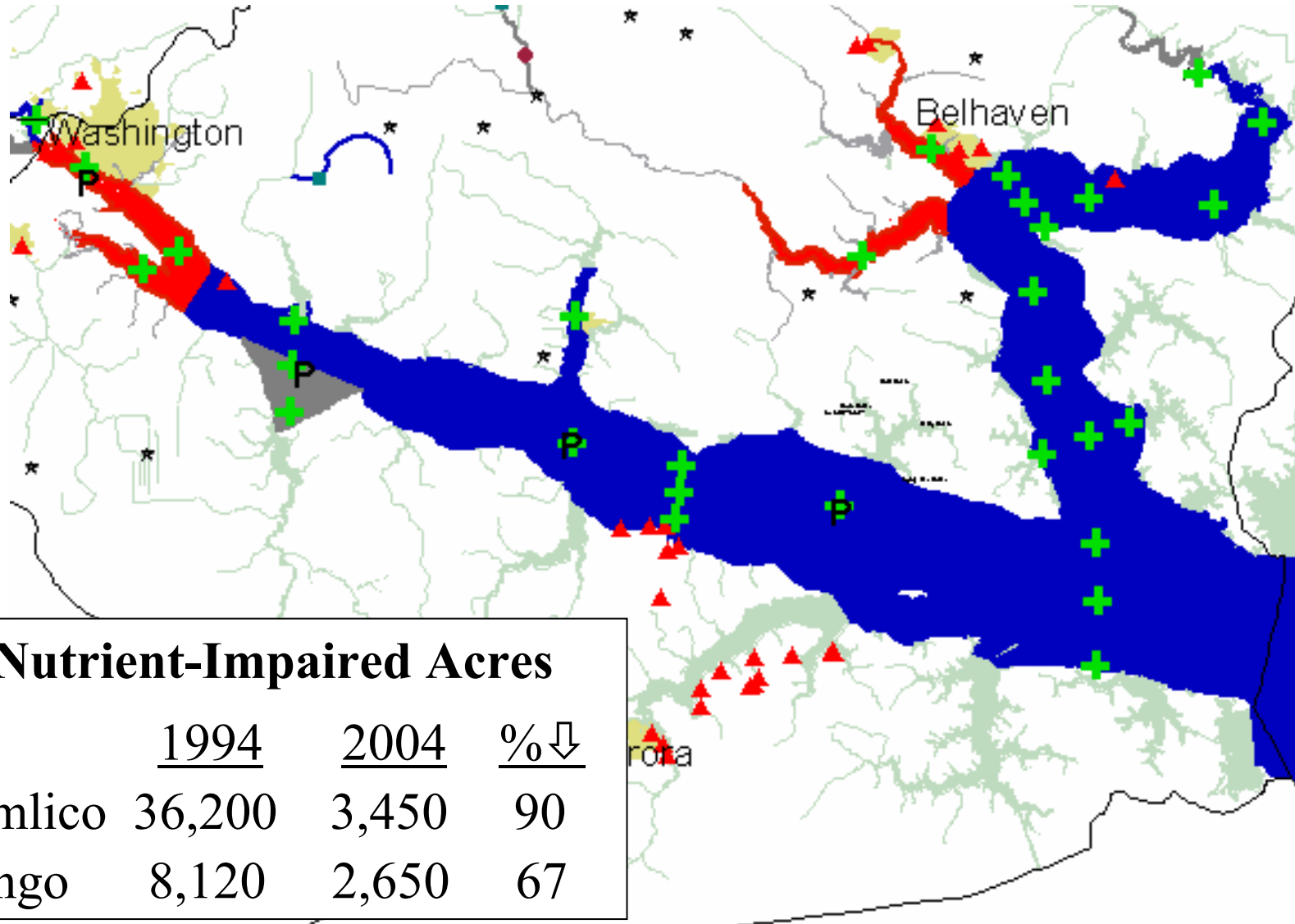


Grimesland



Pamlico & Pungo Estuary Impairment

Tar-Pamlico Basinwide Plan, March 2004



Phase III 2005 - 2014

- Estuary clean-up deadline 2013
- Ag BMP offset improvements w/in 2 years:
 - Revise cost-eff. value for projected BMPs
 - Uncertainty estimate upper bound
 - Spatial weighting for delivery differences?
 - Establish P offset rate
- Refinements not made – estuary re-model, transport improvements
- Environmental groups returned

Tar-Pamlico Review

- Point sources
 - Trades? No.
 - Success? Yes. Cost-effective reductions.
 - Via? Group caps. Existence value to offset...
- NPS:
 - Incomplete coverage - existing development
 - Ag – qualified success (accounting)
- Trading:
 - Selective offset design limiting
- Less pressured basin aiding success

Proposed Nutrient Strategy

Jordan Lake Watershed

- **Reduction goals by lake arm -**
 - Upper New Hope: 35% N ↓, 5% P ↓
 - Lower New Hope: No increases N or P
 - Haw: 8% N ↓, 5% P ↓
- **Point Sources:**
 - Individual load allocations
 - Effluent trading
 - Compliance association + in-lieu exceedence fee
- **NPS rules similar to Neuse/Tar-Pamlico, plus:**
 - All local governments subject to stormwater rule
 - Loading reductions from *existing* development
 - Possible trading among *all* sources

More Information

Tar-Pamlico Nutrient Strategy

<http://h2o.enr.state.nc.us/nps/tarpam.htm>

Neuse Nutrient Strategy

http://h2o.enr.state.nc.us/nps/Neuse_NSW_Rules.htm

Draft Jordan Lake Nutrient Strategy

Report to September 2005 Water Quality Committee:

<http://h2o.enr.state.nc.us/admin/emc/>

Stakeholder Process:

<http://www.tjcog.dst.nc.us/jorlak/jlsp.htm>

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